

Coercion in Polish versus English: processing complex lexical content
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Complement coercion, a meaning-shift in semantic composition, licensed by a particular linguistic item and its argument(s), is usually seen as a repair of a semantically clashing combination. Behavioral data from self-paced reading, eye-tracking and speed accuracy trade-off experiments (Traxler et al. 2002, Traxler et al. 2005, McElree, Pylkkänen, Pickering and Traxler 2006, Frisson and McElree 2008, a.o.), neuroimaging data (Pylkkänen et al. 2007, Husband, Kelly and Zhu 2011) and ERPs (Kuperberg et al. 2010) suggest that there is an extra cost associated with the processing of semantically clashing combinations, where an event-selecting verb receives an entity-denoting argument ((1)a vs.b). These experimental results support the formal analysis of complement coercion as an **enriched form of semantic composition** (Pustejovsky 1995, Egg 2003, de Swart 2011, Asher 2011). The opposing view, that the phenomenon is a case of **ambiguity** between the event reading and the constitutive reading, (2) (Piñango and Deo (2012)), has also been supported experimentally (Lai et al. 2014 show that aspectual verbs like *begin* incur greater processing cost in coercing contexts than psychological verbs like *enjoy*). Given that complement coercion is also dependant on a wider sentential context (Asher 2011)(compare subjects in ((1)c)), it fits the family of combinatorial processes discussed as **co-compositionality** (Pustejovsky, 1991, 1995), where both the predicate and the arguments influence each other to generate a particular meaning (See also McNally and Spalek 2015: (3)).

- (1) a. The boy started the fight.
b. The boy started the book.
c. The cook/boy started the soup.
- (2) The editor's comments finish the magazine.
- (3) a. He *cut* the costs. (= *reduced*)
b. He *cut* a niche in the scene. (= *made*)

Question and Goals: Does the experimental data then support a strict division between the different approaches to complement coercion: semantic enrichment, ambiguity or co-compositionality? We argue that the fact that different experimental setups mitigate the processing cost follows from the fundamental property of the predicate: the **selectional restrictions** of the verbs.

Although Pickering et al. (2005) explicitly contrast the “compositional operations needed to generate a representation for the expression” and the “processes that are responsible for retrieving or inferring the activity implicit in the event structure”, the latter can be built into compositional semantics. In Asher’s (2011) Type Composition Logic (TCL) selectional requirements are encoded in lexical entries as a second level of meaning. On par with quantificational domain restriction (von Stechow 1994, a.o.), selectional restrictions contribute to narrow down the possible inferences. In TCL aspectual verbs not only select for eventualities, but can also justify entities by the introduction of a functor linking the predicate and its mismatching argument.

Thus, the “ease” of coercion in sentences presented out of the blue depends on the ease of the accommodation of the presupposition of the predicate and the typicality of the linking. Support for this view comes from Zarccone et al’s (2015) self-paced reading experiment showing effects for both type requirements and the typicality of the combination between the verb and its arguments. Additionally, Katsika et al. (2014) showed that psych-verbs, which entail (and not merely presuppose) that their internal argument is a target of emotion, do not incur the processing cost in complement coercion that aspectual verbs do. **We contribute further behavioral evidence** that the selectional restrictions of aspectual verbs play a critical role in semantic composition: **in contrast to verbs that select for both entities and eventualities** (such as *see*, *praise*, *describe*), **aspectual verbs facilitate the processing of event-denoting objects**, while the processing of entity-denoting objects is no harder than the processing of objects with *see*-type verbs. **This result supports the view that selectional requirements impose felicity constraints similarly to presupposition triggers**, as those have been shown to facilitate processing during reading (Sedivy 2002, Stolterfoht et al. 2007, a.o.).

In a moving-window **self-paced reading** task (n=36), we tested whether (i) we would replicate the results of Traxler et al. (2002) for Polish; (ii) whether the polysemy of the object noun plays a role. For (ii) we used two types of entity-denoting nouns that are available in Polish: one type are morphologically simple nouns denoting physical objects (e.g. *kolekcja* ‘collection’) and the other type is of a morphologically complex structure in that it contains a verbal root (e.g. *zbiór*, ‘set’, ‘collection’, *zbieranie*, ‘to collect’), but it is not a nominalization (cf. *kolekcjonowanie*, *zbieranie*).

The dominant reading of *zbiór* is the entity-reading, the event-reading is secondary and can be made explicit by the context (*zbiór truskawek*, ‘strawberry picking’). In **sub-design (i)** we used the translations of 24 items from Traxler et al. 2002 (no psych-verbs) in 4 conditions: EventV+EntityN, EventV+EventN, Non-eventV+EntityN, Non-eventV+EventN. **Predictions:** (A) EventV+EntityN is the hardest to process (as in Traxler et al.), (B) In line with the presuppositional approach (Asher 2011), there is a 3-way contrast: (1) easiest processing when the expectations created by the aspectual verb are satisfied (EventV+EventN), (2) harder when an selectionally underspecified verb creates no expectation (Non-eventV+EntityN, Non-eventV+EventN), (3) hardest when there is a mismatch (EventV+EntityN). In **sub-design (ii)** we had 24 items in 4 conditions: EventV+SimpleN, EventV+ComplexN, Non-eventV+SimpleN, Non-eventV+ComplexN. **Predictions:** facilitation in EventV+ComplexN condition. Thus, there were 48 quadruplets (and only 24 unrelated fillers, to keep the time to complete the experiment within 20 minutes).

Results: In (i) there are no main effects of verb-type and noun-type neither at the object nor at the spillover region (in contrast to Traxler et al.). There is a significant interaction in an unexpected direction (see graph): while EventVs are easier with EventNs, Non-eventVs are harder with EntityNs. Therefore, we ran a one-way comparison at Word Position 3 (The boy₀ started₁ a fight₂ today₃ after school₄). EventV+EventN condition is significantly faster ($\beta = -.068$, $SE = .024$, $t = -2.809$, main effect of sentence type, $\chi^2 = 20.96$, $p < .001$), which partly supports (B). In (ii) there are no significant differences between any of the conditions.

Discussion: We see no cost of coercion in EventV+EntityN condition, which means that in our experimental setup (i) the **complement coercion is no more costly** than the integration of new information when there is a lack of prior expectations: Non-eventV+EntityN, Non-eventV+EventN. Sub-experiment (ii) suggests that the ambiguity of the object noun might not be a decisive factor in the processing of complement coercion. The lack of significant differences does not, of course, mean that the relevant conditions do not differ. Perhaps, our experiment was not sensitive enough to detect more differences. Crucially, we see a **significant facilitation when the selectional requirements match** in the combination: EventV+EventN. This shows that **aspectual verbs are very restrictive**, more so than *see*-type verbs, a fact that has not yet received theoretical consideration. **Big picture::** Our behavioral experiments show that the view of selectional restrictions as a way to incorporate conceptual knowledge into compositional semantics, although being on the right track, needs to be strongly refined.

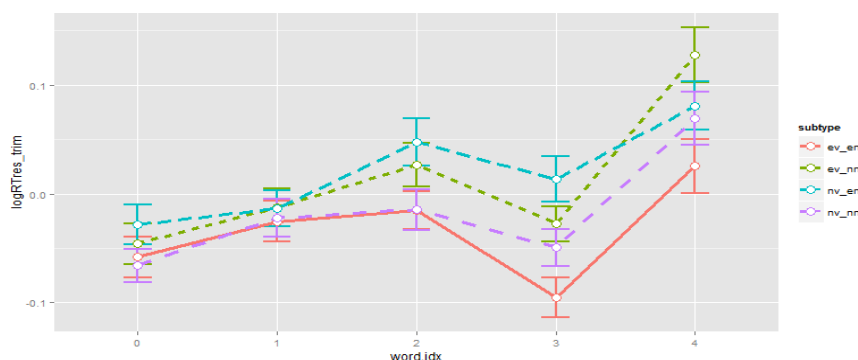


Figure 1: Sub-design (i). Average Log-Transformed Residual Reading Times.

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